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OCCUPATIONAL SAFETY, HEALTH, AND OCCUPATIONAL MEDICINE REPORT



NAVAL NUCLEAR PROPULSION PROGRAM
OFFICE OF NAVAL REACTORS
WASHINGTON, D.C. 20585

DEPARTMENT OF THE NAVY
WASHINGTON, D.C. 20350



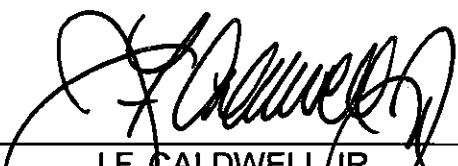
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OCCUPATIONAL SAFETY, HEALTH,
AND OCCUPATIONAL MEDICINE
REPORT

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SUMMARY

The Naval Reactors Program (hereafter referred to as "the Program") is responsible for two DOE laboratories, one DOE facility with two prototype naval nuclear propulsion plants, one DOE facility which operates the Expended Core Facility, and one naval training facility with two nuclear-powered moored training ships. The Program is founded upon the principle of risk reduction through the identification, assessment, and mitigation of hazards when planning for site operations, developing procedures, and designing systems and facilities. The following summarizes the Program's performance in worker protection:

- Robust Safety Culture: The Program maintains a robust safety culture through the implementation of several key principles, including proactive management stance towards safety, peer-to-peer ownership of safety, and commitment to continuous improvement. Primary responsibility for employee safety and health resides with line management and the workers themselves, with assistance and oversight from industrial hygiene, safety, and medical professionals. Inspection, oversight, and feedback systems are designed to provide continuous improvement.
- Correcting Small Problems to Prevent More Significant Problems: The Program focuses on identifying near-miss incidents that do not result in personnel injury and addressing underlying causes. Over the past five years, there has been an overall downward trend in the number of near-miss incidents, indicating that the Program's vigilant efforts to identify and fix small problems are reducing the frequency and severity of safety issues.
- Healthy and Productive Workforce: The number of occupational injuries experienced continued to decline as a result of ongoing efforts to further strengthen the safety culture. In 2015, the Program's recordable injury and illness rate (as defined by the Occupational Safety and Health Administration) was 0.52 injuries per 200,000 hours worked, lower than the Program's five-year average injury rate of 0.63 and more than five times lower than the U.S. general industry rate in 2014 (3.4 injuries per 200,000 hours worked). The Program has experienced no occupationally related fatalities at its DOE facilities or moored training ship facility in over 25 years.

This report and other reports produced by the Naval Nuclear Propulsion Program are available online at:

<http://nnsa.energy.gov/ourmission/poweringnavy/annualreports>

NAVAL REACTORS PROGRAM BACKGROUND, MISSION, AND FACILITIES

Background

The Naval Reactors Program is comprised of military personnel and civilians who design, build, operate, maintain, and oversee operation of naval nuclear-powered ships and associated support facilities. The Program has a broad mandate, maintaining responsibility for nuclear propulsion matters from cradle to grave. Program responsibilities are delineated in 50 U.S.C. §2406, 2511 which codify Presidential Executive Order 12344 of February 1, 1982 (references 1 and 2). These responsibilities encompass:

- The Navy's nuclear-powered warships.
- Two research and development laboratories.
- Contractors responsible for the design, procurement, and construction of propulsion plant equipment.
- Shipyards that construct, overhaul, and service the propulsion plants of nuclear-powered vessels.
- Navy nuclear support facilities and tenders.
- Naval nuclear power schools and training facilities.
- The Naval Nuclear Propulsion Program Headquarters organization and field activities.

The NNPP includes four Government-owned/contractor-operated DOE facilities (Knolls Laboratory, Bettis Laboratory, the Kenneth A. Kesselring Site, and Naval Reactors Facility) operated by Bechtel Marine Propulsion Corporation (BMPC). BMPC also provides technical assistance at one Naval installation (NPTU-Charleston). Each site serves a unique role in the NNPP's mission to develop nuclear propulsion systems, train sailors to operate these systems, and provide lifecycle support from technology development through design and ultimately to disposal.

Bettis and Knolls Sites are principally research and development laboratories devoted solely to naval nuclear propulsion work. With combined staffs of over 6,800 engineers, scientists, technicians, and support personnel, these laboratories develop advanced naval nuclear propulsion technology and provide technical support for the continued safe, reliable operation of all existing naval reactors.

Naval Reactors Facility, located within Idaho National Laboratory, houses the Expended Core Facility. At the Expended Core Facility, naval spent nuclear fuel from nuclear-powered warships and the Program's prototypes is examined for evidence of any unusual conditions such as unexpected corrosion, unexpected wear, or structural defects. The examinations provide data on current reactor performance, validate

models used to predict performance, and support research to improve reactor design. Following examination, this facility also prepares naval spent nuclear fuel for long term storage in locations such as a geological repository.

Kesselring Site houses two land-based prototype nuclear propulsion plants in New York. Prototype facilities provide platforms for the operational testing of promising new designs and technologies under typical operating conditions before introduction into the Fleet. The prototype facilities also support the unique training requirements of the Program and are staffed by highly qualified instructors.

The Program established a Nuclear Power Training Unit (NPTU-Charleston) with moored training ships at Joint Base Charleston, South Carolina, in 1989. Two nuclear-powered submarines, which have been decommissioned and converted for training, are moored at the facility. Navy personnel operate the facility with the assistance of BMPC technical staff.

These facilities provide hands-on training so that, before their first sea tour, all operators have qualified on an operating nuclear reactor. Training on operating nuclear reactors is a cornerstone of the Naval Nuclear Propulsion Program training to ensure continued safe operation of propulsion plants in nuclear powered warships.

Knolls and Bettis Sites are also responsible for shutdown and defueled prototype nuclear propulsion plants in New York and Idaho, which are in various stages of inactivation and dismantlement.

Scope of Report

The Program is solely responsible for OSHOM matters at its DOE laboratories and prototype facilities, which are operated exclusively for the Program. Within the Navy Occupational Safety and Health (NAVOSH) Program, the Naval Reactors Program is responsible for OSHOM matters at NPTU-Charleston. Non-radiological OSHOM matters at other Navy facilities (e.g., shipyards or support facilities) are the primary responsibility of other Navy organizations (although the Program often works with these organizations on OSHOM matters that could affect naval nuclear propulsion plant operations and maintenance). Therefore, this report focuses on the OSHOM programs at Program laboratories, prototype training facilities, Naval Reactors Facility, and NPTU-Charleston.

As stated in the summary, this report covers non-radiological OSHOM programs at Program facilities. The Program is also responsible for radiological health and safety at all Program DOE and Navy facilities and ships where naval nuclear propulsion work is performed. Radiological safety and health information for the Program is described in detail in two other publicly available reports (references 3 and 4). This report covers calendar year 2015. Occupational safety and health data for calendar years 2011 through 2015 are included to allow comparison of Program performance in recent years.

Past Operations

Safety, Industrial Hygiene, and Occupational Medicine programs were developed and implemented in the earliest years of the Program in the form of documented principles, practices, procedures, and facility safety manuals. The Atomic Energy Act of 1954 assigned to the Atomic Energy Commission (AEC), the predecessor to the DOE, responsibility for regulation of activities conducted pursuant to the Act to protect safety and health. Basic requirements were promulgated by the AEC Manual, Part 0500 "Health and Safety", which established standards applicable to all AEC contractor operations. OSHOM programs were staffed with individuals dedicated to these functions.

Since passage of the Williams-Steiger Occupational Safety and Health Act of 1970 (OSH Act), the national standard of care for occupational safety and health has improved. Under the OSH Act, the Program retained authority for OSHOM programs of its contractors and has mandated proactive programs and practices at least as stringent as those required by the Occupational Safety and Health Administration for commercial facilities. The various contractor safety, industrial hygiene, and medical programs have been dynamic and have grown substantially since their inception.

Militarily Unique Mission and Facilities

As previously stated, a major responsibility of the Program is to train naval personnel to operate naval nuclear propulsion plants. At NPTU-Charleston, this training is conducted aboard specially modified, moored nuclear-powered submarines that have been decommissioned and converted for training. At one Program DOE facility, training of naval personnel is conducted in land-based prototype naval nuclear propulsion plants, which are representative of the engineering spaces aboard naval nuclear-powered warships. Qualified naval and contractor personnel conduct the training.

Procedures used by the Program to operate the nuclear reactors and associated systems in the land-based prototype propulsion plants are identical to those used in warships. This includes the use of the same Navy shipboard occupational safety and health requirements as those applied in the Fleet. The Navy safety and health requirements are tailored to meet the militarily unique aspects of the "sea services" and combat roles of warships. Training naval personnel in settings and operations identical to those encountered at sea is a fundamental tenet of the Program that directly contributes to the safe operation of shipboard reactors.

In implementing the OSH Act, Executive Order 12196 (reference 5) and 29 CFR 1960 (reference 6) recognized the unique equipment and operations used by the military and exempted militarily unique equipment and operations from coverage by OSH Act regulations. Heat stress, lock-out/tag-out procedures, and structural safety requirements (e.g., hand rails) are examples of areas where civilian OSHOM requirements must be reconciled with the configuration and operational requirements of militarily unique equipment. For such equipment and operations, the Department of Defense NAVOSH occupational safety and health programs (references 7 and 8) ensure that personnel are protected.

POLICY AND IMPLEMENTATION

Naval Reactors Program Policy

It is the policy of the Program to eliminate or control workplace hazards at Program facilities such that all employees are provided with a safe and healthful workplace and return home each day in the same, if not better, condition than the condition in which they arrived. Naval Reactors believes that to have an effective safety program, a culture must be established which values a willingness to learn from mistakes without adding unnecessary requirements, which encourages reporting of and correcting unsafe practices and conditions without fear of retribution, and which has in place a just process to investigate and correct underlying systemic issues.

Naval Reactors issued the above revised policy and the following guiding principles in December 2007. Adoption and application of these principles is the cornerstone of an effective safety program.

- Maintain a Just Culture: Recognizing that only a small portion of errors and unsafe acts are reckless, the response to most safety-related problems must primarily focus on the systemic failures that caused the event. This just mindset results in a work environment built on a foundation of mutual trust between all levels of the organization.
- Proactive Management Stance: Steps are taken by management to identify recurrent error traps and remove them. Workplace and organizational factors likely to provoke errors are identified and eliminated. Management conducts routine surveillances to identify and correct safety program weaknesses.
- Ownership of Safety Programs: Employees demonstrate individual and peer-to-peer (i.e., work-team backup) ownership of safety for themselves and those around them.
- Culture of Learning: All organizational personnel are encouraged to acquire the mental and technical skills necessary to achieve safe and effective work performance by developing an eye and attitude that anticipates possible errors.
- Promote Self-Identification of Safety Related Problems: Measures are established that eliminate fear of management reprisal and promote development and modification of safety practices throughout the organization by each individual.
- Participation in Safety Programs: Personnel from all departments and levels are involved in developing, implementing, and reviewing safety programs, including problem analysis and resolution.
- Commitment to Continuous Improvement in Safety of the Workforce: Personnel at all levels of the organization are committed to apply the necessary resources to identify and implement improved safety practices where appropriate.

- Application of Lessons Learned: Safety-related problems and lessons learned are routinely reviewed at high-level organization meetings. Lessons learned that are systemic in nature are implemented as facility-wide reforms rather than localized to the specific event.
- Conflict Resolution: Measures are in place to address conflicts between safety programs and other organization goals in a timely, effective, and transparent manner.

OSHOM Program Elements

Engineering methods are utilized first to eliminate and minimize hazards to the extent possible. Remaining hazards are controlled through detailed technical work procedures and supervisory oversight practices that are recognized as industry standards. These techniques include:

- Establishment of Responsibilities: All levels of management and supervision are assigned accountability and ownership for the safety and health of themselves, their workers and their peers.
- Qualified Professional Staffing: The OSHOM programs at Program facilities include certified professionals in the disciplines of Occupational Safety, Industrial Hygiene, and Occupational Medicine.
- OSHOM Training of Management and Workers: In addition to the professional OSHOM staff, numerous other site personnel are trained and assigned collateral OSHOM duties, such as workplace safety monitors. Site management, supervisors, and workers are trained on policies and procedures, physical and chemical hazard recognition, control strategies and requirements, emergency procedures, and employee concern resolution processes. Furthermore, all employees receive behavior-based safety training to help them recognize and correct at-risk behavior patterns that could lead to mistakes and injuries.
- Planning: Site safety and health professionals review work plans and specifications to ensure that potential hazards have been identified and eliminated or mitigated.
- Identifying, Tracking, and Trending Safety Deficiencies: All employees are trained to play an active role in the identification and correction of potential hazards and minor safety deficiencies to ensure that small problems do not become large issues and that the workplace is free of recognized hazards. Tracking mechanisms are in place to monitor the status of safety deficiency corrective actions and to facilitate periodic data analysis to support early identification of performance trends.
- Emergency Planning: Emergency procedures are well documented. Emergency responders and supervisors must pass initial qualifications and routinely drill to

maintain and improve their response skills. Trained personnel are available around the clock to respond to emergency situations and provide first-aid.

- Extension of OSHOM Program to Subcontractor Employees: Subcontractors working at Program facilities are required by contract to work to safety and health requirements consistent with those implemented for Program facility employees. Subcontractor compliance with safety and health requirements is overseen by site personnel. Information on subcontractor performance, including safety event and injury data, is incorporated into the Program data presented in figures 1 through 5.
- Written Requirements: Employees work to detailed written requirements, such as manuals and procedures, which incorporate safety and health requirements.
- Routine, Independent OSHOM Assessments: Naval Reactors Headquarters and field office personnel, as well as dedicated auditors within the site's organization, independently evaluate OSHOM programs. Assessments are detailed, formal, and documented; corrective actions are tracked to closure.

Hazard Assessments

The Naval Reactors OSHOM Program is founded upon the principle of risk reduction via the identification, assessment, and elimination/mitigation of safety or health hazards. Hazard evaluation and mitigation is a fundamental and inherent step to planning and performing any Program work, including facility operations and the design of facilities and systems. The degree and formality of the hazard evaluation is commensurate with the magnitude, complexity, and/or uniqueness of the task or design.

Methods of identifying and assessing hazards include:

- Baseline safety and industrial hygiene surveys.
- Routine self-inspection and self-appraisal programs.
- Hazard analysis processes, which include the assessment of potential hazards associated with certain job categories or specific tasks and identification of hazard mitigation actions.
- Industrial hygiene monitoring programs that use state-of-the-art equipment and independent laboratory analysis in accordance with nationally recognized procedures.
- Accident investigation systems, which ensure timely review, provide written reports with thorough causal analyses, and ensure responsive corrective actions are tracked to closure.
- Independent audit and surveillance programs which verify, through formal evaluations and assessments, that worker protection standards are being met.

As hazards are identified and assessed, mitigation strategies are developed to protect employees. Hazard mitigation adheres to the fundamental principle that the most direct, effective, and feasible hazard mitigation measures, built around the following hierarchy of controls, are implemented:

1. Eliminate the hazard where feasible and appropriate.
2. Utilize engineering controls where feasible and appropriate.
3. Apply administrative controls that limit worker exposures.
4. Use Personal Protective Equipment (PPE).

Worker Participation

Workers participate in various committees, internal programs, and facility audits and inspections. Employees are encouraged to report their concerns to management, report them to safety and health professionals, or formally document them via an employee concerns program (reference 9). Employee/management communications include follow up and tracking of employee concerns and of issues identified during inspections, audits, or committee meetings.

OSHOM REQUIREMENTS

Naval Reactors Program Authority and Responsibility for Occupational Safety and Health

Under the Atomic Energy Act of 1954, the DOE is assigned authority to set and enforce occupational safety and health standards for facilities and activities covered by the Act. Within the DOE, authority to set and enforce these standards at Program facilities is assigned to the Deputy Administrator for Naval Reactors, pursuant to 50 U.S.C. §2406, 2511 which codify Presidential Executive Order 12344 of February 1, 1982 (references 1 and 2). These documents establish that the deputy administrator of the Program is responsible for all matters pertaining to naval nuclear propulsion. The Program establishes and enforces OSHOM requirements at Naval Reactors DOE facilities, independent of other DOE organizations (e.g., nuclear fuel and weapons production operations); this ensures that OSHOM standards support the militarily unique training mission (discussed earlier) and that they are consistently applied and technically sound.

For nearly all other civilian workplaces, the Occupational Safety and Health Act of 1970 provides authority to set occupational safety and health standards. The OSH Act excludes from its scope activities that are regulated under separate statutory authority, such as the Atomic Energy Act discussed above. For Federal workplaces, each Federal agency (e.g., the Department of the Navy, the DOE) is responsible for establishing and maintaining an effective and comprehensive occupational safety and health program consistent with the OSH Act. The Navy's program and standards are documented in OPNAV Instruction 5100.23 (reference 7). Consistent with 50 U.S.C. §2406, 2511 which codify Executive Order 12344 (references 1 and 2), the Program enforces the implementation of these requirements, as well as the militarily unique requirements in OPNAV Instruction 5100.19 (reference 8), at the one naval training facility with two nuclear-powered moored training ships and the one DOE facility with two prototype naval nuclear propulsion plants.

Naval Reactors Safety Requirements Manual

In 2009, the Program implemented the Naval Reactors Safety Requirements Manual (SRM) (reference 9). The SRM references the OSHOM standards selected as the basis for the Program requirements, including Federal regulations, DOE directives, NAVOSH program requirements, and Program directives. Additional requirements have also been specified to ensure compliance with NR safety program standards. The goal of the SRM is to provide a streamlined approach to documenting and communicating safety requirements, written in such a way as to be easily understood by the workforce. The SRM replaces the Health and Safety Standards Reference Document (HSSRD) (reference 10), which listed safety, health, and fire protection standards selected for implementation at each Program facility. The HSSRD is being phased out for use as historical reference. The requirements in remaining chapters in the HSSRD ("Pressure Equipment, Boilers, Pressure Vessels, Piping Systems" and "Fire Protection") are being transferred to other manuals.

Implementation of DOE Directives and Navy Occupational Safety and Health Program Requirements

The Program uses DOE directives to aid in setting the standards for its DOE facilities. Since DOE directives are focused on non-military activities, some of the requirements may not be directly applicable to Program activities. Such requirements are modified by the Program as necessary to integrate the DOE requirements with Navy occupational safety and health requirements and militarily unique systems and operations, in order to prevent conflicts with Navy training requirements and to maintain the prototypes' ship-like environment.

Because the moored training ships are part of a Department of Defense facility, in general, Navy occupational safety and health requirements are applied (references 7 and 8) as specified by the SRM (reference 9).

Occupational Medicine Program Requirements

The Program occupational medicine requirements for contractors at DOE facilities are consistent with the DOE's occupational medicine requirements (reference 11). Navy occupational medicine requirements (reference 12) are applicable to naval personnel at DOE facilities and NPTU-Charleston.

PERSONNEL

Naval Reactors Contractor Health and Safety Council

The Program maintains the NR Contractor Health and Safety Council, whose membership includes senior safety and health professionals from each Program facility. The purposes of the Council are (1) to provide a forum in which experiences and information can be exchanged and new safety and health initiatives can be identified and quickly implemented, and (2) to maintain the NR Program and Corporate manuals (e.g., SRM). The Council accomplishes these functions during conferences held at least monthly. In addition, the Council meets annually with Program Headquarters personnel to review performance and establish performance objectives for the coming year.

Professional Staffing

Professional staffing is assigned to OSHOM programs to ensure a safe and healthful workplace at all Program facilities. All key occupational safety and health professionals satisfy, at a minimum, the requirements contained in the United States Office of Personnel Management standards for Safety and Occupational Health Manager, Safety Engineer, or Industrial Hygienist (reference 13). Each Program activity is staffed by, or has contractual arrangements with, one or more physicians who are board-certified or experienced in occupational medicine.

The Program's safety and health professionals are qualified by their academic backgrounds and/or experience to perform workplace evaluations, technical monitoring, testing, consulting, and other essential functions of their professions. Involvement with professional organizations is supported and facility staff hold memberships in a variety of major safety and industrial hygiene professional societies.

Many safety and health professionals hold certifications from the American Board of Industrial Hygiene and/or the Board of Certified Safety Professionals. These professionals must pass rigorous examinations to certify that they are specially trained, knowledgeable, and competent in industrial hygiene and/or safety.

The capabilities of all safety and health professionals are enhanced by attendance at professional technical society meetings, participation in continuing education programs at universities and other recognized training centers, and involvement with internal education and training programs developed by individual Program facilities. These activities are designed to improve the safety and health professionals' ability to recognize potential workplace hazards; measure, analyze, and evaluate occupational safety and health trends; and define and implement effective controls.

OSHOM managers are experienced individuals with extensive education and rigorous training that specially qualify them to manage these programs. Although these managers report to the facility manager (Commanding Officer at NPTU-Charleston), their oversight role remains independent from production concerns.

The safety and health professionals at Program facilities monitor the workplace, evaluate workplace hazards, implement appropriate controls, review work procedures for proper safety controls, analyze safety and health performance indicators, and maintain appropriate records. In general, however, the safety and health professionals are not directly involved in facility operations unless specific safety issues arise. In such cases, they work with the facility operations staff and Navy personnel to resolve the issue.

Operations Personnel

The Program promotes ownership of safety by the workers at all levels of the organization. Operations personnel are provided general and job-specific safety training to enable them to identify safety hazards and unsafe work practices and take action to enable the prompt resolution of the deficiency.

First-level operations supervisors, such as work-area managers, are given primary responsibility for the safety and health of their subordinates. With the assistance of Program safety professionals, these personnel are responsible for the identification and development of Program specific safety requirements and best practices to ensure the safe and efficient conduct of Program operations and maintenance.

Upper-level operations managers at Program facilities are also responsible for the safety and health of personnel. They reinforce the importance of safety and health requirements by establishing applicable policies and objectives and assigning appropriate responsibility and authority to all levels of management and supervision.

Each operating facility also maintains a safety representative program, in which an individual from a work area (e.g., a department) serves as a safety representative. The safety representatives are given additional training, attend periodic meetings, and are tasked with monitoring their work area to identify any hazards or unsafe work practices to safety and health professionals and operations management.

Naval Reactors Field Representatives

All Program facilities have a co-located Naval Reactors field office. The field office is staffed with Naval Reactors personnel who report directly to Headquarters and whose function is to ensure contractor compliance with Program requirements. The field office representatives provide independent oversight of facility operations, thereby allowing Naval Reactors Headquarters to maintain close surveillance of events occurring at the facilities. Each field office has personnel with specific responsibilities in OSHOM matters to effectively oversee facility OSHOM programs.

Navy Personnel Assigned to Naval Reactors DOE Facilities

Active-duty Navy personnel are assigned to Naval Reactors DOE prototype facilities and NPTU-Charleston to conduct and receive training in the operation of naval nuclear propulsion plants. The safety and health of these personnel is the overall responsibility of the Commanding Officer, Nuclear Power Training Unit (located on site). Each

prototype plant and the moored training ships have safety representatives who are responsible for ensuring that safety and health requirements are implemented and followed. The safety representatives have access to, and work with, the safety and health professionals at the facility to resolve any OSHOM issues.

The Commanding Officer also maintains a liaison with a nearby Naval Branch Medical Clinic, which provides occupational medicine support services to Navy personnel. The facility OSHOM personnel work with the affiliated Naval Branch Medical Clinic to ensure the safety and health of Navy personnel.

Emergency Response Capability

Each Program facility has emergency response capabilities for significant events. At each facility, qualified individuals are assigned to respond to the scene of any emergency that may occur, evaluate the circumstances, and initiate appropriate corrective actions. When necessary, a separate emergency control center is manned with personnel specially trained to handle a variety of emergencies.

Individuals are assigned to emergency response teams on the basis of their expertise and experience. Emergency responders frequently train and drill to improve their skills and maintain their qualifications. Major drills involving the entire emergency response team are conducted periodically; smaller drills involving limited participation are conducted more frequently.

Each operating facility has personnel qualified to provide emergency medical care. Most facilities are also staffed with one or more medical doctors during normal business hours. Additional groups of individuals (e.g., Emergency Medical Technicians) are specifically trained and assigned to provide medical assistance. Each facility has arrangements with a local hospital to provide emergency medical care beyond the capabilities of facility medical personnel and conducts a drill with emergency responders at least once a year.

HAZARD IDENTIFICATION AND ANALYSIS

Regulations, Requirements, and Technical Information

To maintain a current level of knowledge and expertise in this area, occupational safety and health professionals:

- Review the Federal Register (reference 14) and subscribe to review services to identify new or proposed regulations and determine their applicability to Program facilities. The results of these reviews are provided to the other safety and health professionals and operations personnel.
- Review and incorporate applicable safety and health requirements and lessons learned into facility procedures. Such requirements and lessons learned are found in DOE and Navy safety and health bulletins and other relevant documents.
- Maintain professional certification in the fields of safety, industrial hygiene, or occupational health.
- Participate in professional societies (e.g., the American Industrial Hygiene Association, American Society of Safety Engineers, American College of Occupational and Environmental Health, and the American Association of Occupational Health Nurses) that provide information via publication of professional journals, national conferences, seminars, and society meetings.
- Discuss and resolve safety and health issues in the NR Contractor Health and Safety Council conferences.

Project Evaluation

Site projects involving work that could affect the safety and health of personnel are reviewed and evaluated by the activity and the respective facility safety and health professionals. These evaluations typically involve review of the work project from initial concept through the development of detailed work procedures or construction plans and technical specifications. One of the primary functions of this conceptual review is to identify alternate methods or materials that can eliminate or reduce the hazards associated with the project under review. Project managers, with the assistance of safety and health professionals, ensure that applicable safety and health practices are integrated into written work procedures and that all applicable fire and life safety code requirements are satisfied.

The qualifications and work practices of subcontractors to perform specific facility project work are evaluated by project managers and safety and health professionals to ensure that subcontractor work meets Program standards. The safety and health standards that subcontractors must use are incorporated directly into the contractual requirements set forth in requests for proposals and purchase orders.

High Risk Work

High risk work is defined by the Program as any evolution that, if performed improperly, may present a significant risk of injury or fatality (e.g., certain types of electrical work, work requiring personal fall protection). The SRM (reference 9) includes requirements for high risk work which are the product of a comprehensive review, performed in February 2007, by representatives of each Program facility of safety practices used during industrial work. Specifically, the SRM defines the types of high risk work and provides requirements for engineering, planning, controlling and overseeing the conduct of that work.

The high risk work requirements apply during all phases of the proposed high risk work: the up-front engineering and planning of the work, the preparation of the worker who will perform the work, and the actual execution and oversight of the work. During the engineering and planning phase, the requirements state that hazards should be eliminated if feasible and appropriate. When eliminating the hazard is not practical and management decides the high risk work is necessary, hazard control mechanisms are engineered commensurate with the risk posed by the work. For example, additional safety controls, specialized worker training, and additional oversight may be included in the work plan. Formal, written instructions are required for the conduct of all high risk work. Supervisor and worker formal acknowledgement along with senior management authorization is required to conduct high risk work. All employees performing high risk work are expected to understand the need for the high risk work, the safety requirements implemented to protect them, and the written instructions they will follow. After being briefed, the workers sign the high risk work plan indicating that the plan provides an effective hazard mitigation strategy to safely perform the work. Any employee has the authority to stop work to resolve any concern regarding the continued safe performance of the work. The process provides assurance that high risk work is conducted reliably and that all parties are in agreement that the selected method is the safest way to perform the work.

Procurement Reviews

Each Program facility has a formal system to evaluate purchase requests for equipment and chemicals to minimize or eliminate safety and health hazards. This system includes approval of purchase requests by operations management with concurrence by safety and health professionals. Safety data sheets (SDS) for all products or materials proposed for use are reviewed by the facility's operations personnel and safety and health professionals before their initial use. This system allows identification of potential hazards and implementation of the proper protective measures to reduce these hazards.

Hazard Analyses

Hazard analyses, such as job hazard analyses or task-specific hazard analyses, are processes used throughout the Program to review work practices, identify safety hazards and risks associated with the work, and formally identify risk mitigation actions to protect employees.

Once potential hazards of a job or work task are identified, actions are taken to minimize the hazard and communicate appropriate precautions. Cognizant supervisors are responsible for ensuring that hazards are addressed and that corresponding tasks, equipment, or material changes are implemented. Safety and health professionals may help supervisors prepare hazard analyses and review them for accuracy and completeness.

Hazard analyses are used in training individual employees, preparing for planned safety observations, reviewing job procedures, and evaluating jobs for improvements in safety and health methods. Whenever a significant safety or health issue arises, further analyses are conducted and procedures may be altered to incorporate the lessons learned.

Industrial Hygiene and Medical Workplace Hazard Evaluations

The basic elements of industrial hygiene and occupational medicine workplace hazard evaluations at Program facilities include:

- Use of appropriate exposure limits established by the Navy Occupational Safety and Health (NAVOSH) program, Occupational Safety and Health Administration (OSHA), and American Conference of Governmental Industrial Hygienists (ACGIH) (references 7, 8, 15, 16, and 17).
- Regular worksite assessments by industrial hygiene and medical staff to evaluate potential health hazards.
- Documented review of materials, processes, work practices, and procedures used on specific jobs to determine hazard exposure potentials. These reviews determine specific job tasks that warrant routine or non-routine exposure monitoring, the use of personal protective equipment, or development of standardized work procedures to characterize and mitigate hazard exposure.
- Establishment of workplace exposure monitoring programs that characterize potential hazard exposures during normal job activities throughout the facilities. Exposures are determined using standard exposure monitoring protocols as defined by the National Institute for Occupational Safety and Health (reference 18) and other recognized formats.
- Pertinent information is forwarded to the occupational medicine department for use in evaluating the workplace environment and/or hazards applicable to each employee.
- Submission of validated exposure data to the occupational medical staff for evaluation and incorporation into DOE facility personnel medical records. For Navy personnel, relevant exposure data are sent to the Naval Branch Medical Clinic for inclusion in personnel medical records.

- Feedback to supervisory and management personnel on the results of employee exposure evaluations and monitoring so that procedural changes can be made if required.
- Medical examinations of personnel, based on potential exposures determined by the processes noted above.

Trend Analysis

Event reports, injury/illness documentation, medical clinic records, safety deficiency reports, and other records are reviewed frequently to ensure problem areas are identified and corrective actions are appropriate. At Program DOE facilities, injury and illness data for civilian personnel and subcontractors are compiled quarterly and submitted to the DOE. Accident reports for naval personnel at DOE facilities and NPTU-Charleston are submitted to the Navy in accordance with NAVOSH requirements (reference 20).

Analyzing trends is one of the most effective ways to identify problem areas and institute appropriate corrective measures to reduce accidents. Evaluations of each reportable occurrence are factored into continual trend analysis by process/operation, type of injury/illness, type and frequency of safety deficiencies, or any other categorization needed to focus improvement actions at the root causes. In addition, workers' compensation records and medical clinic records provide supplemental accident history which may be used in reviewing injuries and illnesses. Following review, corrective actions (e.g., procedure revision, evaluation of work practices, additional training, hazard analysis updating) are taken. Program facilities analyze safety events and documented safety deficiencies, including those that do not involve injuries or illnesses, so that improvements may be implemented to prevent serious injuries. Key statistics, used as indicators to measure the effectiveness of OSHOM programs and trend analysis, are located in the "Measures of Performance" section of this report.

HAZARD CONTROL

OSHOM Manuals

All Naval Reactors Program facilities follow requirements defined in safety, industrial hygiene, and occupational medicine manuals. Operations personnel prepare detailed written operating procedures and maintenance/repair instructions that incorporate safety and health requirements from these OSHOM manuals.

In concert with the initiative to develop the Naval Reactors Safety Requirements Manual (reference 9) previously mentioned, the Program has developed a Corporate Safety Manual (CSM). The CSM captures best practices and standardized work practices and processes to implement the SRM-prescribed safety requirements Program-wide. The vision is to develop and implement a standardized safety program for all work performed at Program facilities to ensure a high degree of worker safety and compliance with all applicable Program safety standards and enable seamless sharing of safety-related resources between Program facilities. As chapters are added, the CSM will replace portions of facility-specific safety manuals and procedures.

In 2009, the Program facilities implemented the SRM (reference 9) and associated CSM chapters developed during the initiative described above. Development work continues to incorporate all safety areas from the SRM into the CSM.

New Employee Indoctrination

Program facilities indoctrinate all new employees in occupational safety and health matters. This training includes facility safety instructions, procedures for reporting injuries and concerns, employee responsibilities, personal protective equipment, introduction to the facility's OSHOM program, and an overview of various facility emergency procedures.

Hazard Communication and Awareness Training

Hazard communication programs train workers to recognize workplace hazards through chemical labeling, manufacturer's safety data sheets, and discussions of hazards associated with certain job tasks or work areas where chemicals are used or stored. Hazard communication programs also train workers in the appropriate protective measures needed to minimize exposure to identified chemical hazards.

In addition to hazard communication programs, general hazard awareness training is conducted to sensitize workers to look for and correct unsafe conditions or work practices that could result in injury. General hazard awareness training emphasizes and reinforces the concept that thoughtful action and attention to detail will significantly reduce the chance of personal injury.

Continuing Training Programs

Training on OSHOM programs, as well as on many other aspects of each employee's job assignment, is regularly conducted at Program facilities. Continuing training provides updates on new requirements, emphasizes lessons learned from Program events, and ensures necessary skills and qualifications are maintained.

Navy Student and Instructor Training

Navy students and their instructors make up a large portion of the Program population at the New York prototype facility and the majority of the population at NPTU-Charleston in South Carolina. The rigorous training and qualification program for all naval nuclear propulsion plant operators includes key shipboard occupational safety and health requirements such as electrical safety, chemical use, emergency response actions, protective equipment, hazardous energy control, and other related safety requirements.

Informational Bulletins

Informational bulletins (e.g., DOE and Navy newsletters, training course schedules, defective materials notifications, other sources of OSHOM news) are distributed to NR Contractor Health and Safety Council members and the Naval Reactors field offices. These bulletins help Council members stay up to date with the latest OSHOM developments and pass this information on to facility personnel. Each facility subscribes to a number of OSHOM publications.

Safety Representatives

Each Program facility has a safety representative program. Safety representatives perform work area surveillances and are required to submit written reports to work area management for improvement actions. These representatives also act as a conduit through which other employees express safety-related questions or observations. Employee suggestions are actively solicited and evaluated for potential implementation. Representatives meet regularly to receive training, discuss concerns, and provide the safety and health professionals and operations management with recommendations for improvements to facility OSHOM programs.

Concern Reporting

The Program has an employee concerns program in place (reference 9). The employee concerns program enables employees to raise safety and health concerns to the attention of management or safety and health professionals for corrective actions. Under these programs, employees may choose to report concerns anonymously. If the employee chooses not to report anonymously, the employee is informed of the status of corrective actions associated with the concern.

If an employee is not satisfied with the problem resolution, the concern will proceed to the next higher level of management. If the employee is not satisfied with the resolution

from the facility management chain, a procedure is in place to file concerns directly with Naval Reactors field office representatives. Employees may also bypass the management chain and file concerns directly with the Naval Reactors field office.

Tracking and Follow-up Systems

All Program facilities have a systematic process for ensuring the prompt resolution of safety and health issues. Safety and health hazards are corrected immediately, if possible, or stabilized to minimize associated hazards and then formally documented for tracking until final resolution. To ensure that all issues are resolved promptly, open issues are prioritized by hazard severity, and appropriate personnel are assigned to complete corrective actions by a given date.

Subcontractor Performance at Program Facilities

Each Program facility has procedures established for subcontractor work, including bidding, specification, and oversight requirements. Subcontractors augment the in-house work force for construction projects and maintenance work exceeding in-house capacity. Subcontractors performing work at Program facilities are required by contract to comply with safety and health standards consistent with the standards normally invoked at those facilities.

A multi-year subcontract is in place with Huntington Ingalls Industries – Newport News Shipbuilding to complete prototype maintenance and inactivation work at the Kesselring Site in New York. Newport News Shipbuilding has extensive experience in the construction and servicing of naval nuclear-powered vessels. In addition to the oversight provided by the prime contractor responsible for facility operations, Newport News Shipbuilding employs full-time, onsite safety and health professionals who implement OSHOM programs for their work the same as or analogous to those instituted by the prime contractor.

Subcontractor Worksite Overview

All subcontractors at Program facilities are responsible for the safety and health of their employees and their subcontractors, and for taking corrective action on safety and health deficiencies resulting from their operations.

Subcontractors performing work at Program facilities are responsible for indoctrinating their personnel on all safety and health requirements, and on any job-specific requirements. The facility safety and health professionals may assist in these indoctrinations. For major subcontractors, full-time health, safety, and/or medical professionals may be required, and regular formal meetings between the subcontractor and various facility organizations are held.

For each subcontract, there is a qualified facility employee who is responsible for day-to-day oversight and coordination of subcontractor operations. In addition to tracking the progress of the work, this individual checks the adequacy of the subcontractor's safety and health programs. Each facility's safety and health professionals also monitor

the subcontractor's compliance by conducting inspections and assessments of work areas. Corrective actions are formally communicated to the subcontractor and tracked in the same way as other such actions at the facility.

HEALTH EVALUATION, DIAGNOSIS, AND TREATMENT

The occupational medicine programs at Program facilities are integrated into operations to ensure adequate assessment of factors that affect personnel health and well being. Occupational medicine program elements are documented in the Naval Reactors Safety Requirements Manual (reference 9) and include routine employee health examinations, as well as diagnosis and treatment of occupationally-related injury or illness.

Employee Health Examinations

Regular, routine health examinations are given to site employees in order to:

- Determine whether the employee's physical and mental health are compatible with the safe and reliable performance of assigned job tasks, including compliance with the Americans with Disabilities Act of 1990.
- Detect evidence of illness/injury and determine if there appears to be an occupational relationship.
- Contribute to employee health through prevention or early detection and treatment of occupationally-related injury or illness.
- Provide an opportunity for intervention by assessing risk factors which cause premature morbidity or mortality (e.g., hypertension, smoking, elevated lipids).
- Maintain documented records of the physical and mental health experience of employees.

Comprehensive health examinations are conducted by a licensed physician or by an Occupational Health Examiner under the direction of a licensed physician in accordance with accepted medical practices.

Routine health examinations/evaluations are required (reference 11) and occur throughout an employee's career under the following circumstances:

- Pre-placement Evaluation — Medical evaluations of job applicants are conducted before initial performance of job duties and, in the case of current employees, before a job transfer. The health and fitness for duty of individuals are determined to ensure that assigned duties can be performed safely and reliably. Evaluations include review of applicable hazard analyses pertaining to the applicant/employee.
- Medical Surveillance Examinations and Health Monitoring — Special health examinations and health monitoring are conducted for employees who work in jobs involving specific physical, chemical, or biological hazards.

- **Qualification Examinations** — Examinations are conducted to qualify employees for job assignments for which specific medical qualification standards exist (e.g., special vehicle drivers, protective force personnel, respirator wearers).
- **Voluntary Periodic Examinations** — Voluntary periodic examinations are offered to employees. The frequency and type of examination offered is determined by the individual's age and work exposures.
- **Return to Work from Occupational Injury or Illness** — All employees with occupationally related injuries or illnesses are evaluated before they may return to work. The scope of this evaluation is determined by the Occupational Health Examiner based on the nature and extent of the injury or illness and is designed to ensure that the employee may return to work without undue health risk to himself or herself, or to others.
- **Return to Work from Non-occupational Injury or Illness** — Employees with significant non-occupationally related injuries or illnesses are evaluated before returning to work. The scope of the evaluation is dependent upon the nature of the injury or illness, and is undertaken to ensure that the employee may return to work without undue risk to himself or herself, or to others.
- **Termination Health Evaluations** — For employees leaving the Program, a health examination is made available to those who have known occupational illnesses or injuries; to those with documented or presumed exposures requiring evaluation by OSHA regulations (references 15 and 16); or to those who have not been examined for more than a year. Additionally, a health status review is made available for all terminating employees.

Diagnosis and Treatment of Injury or Illness

All occupational injuries or illnesses, no matter how slight, are evaluated by medical personnel. Diagnosis and treatment of occupational injury or illness is prompt, emphasizing rehabilitation and return to work at the earliest time compatible with employee health and job safety.

A close liaison exists between the medical and safety/health communities to ensure that the causes of occupational injury or illness are fully evaluated and promptly acted upon.

Medical Services for Navy Personnel

Medical evaluation and care for Navy personnel at DOE facilities are the responsibility of the local Naval Branch Medical Clinic. Immediate and emergency medical treatment for injuries or illnesses at DOE facilities is provided by the facility medical staff, with immediate follow-up consultation with Navy medical personnel. If further diagnosis or treatment is warranted, the patient will be transported to a nearby military or civilian medical facility. Follow-up medical treatment or evaluation is provided by naval medical services.

Communication between DOE prototype facility personnel and naval medical staff is coordinated through the Commanding Officer, Nuclear Power Training Unit, located at that facility. Navy medical staff visits the Program DOE facilities periodically and communicates directly with facility medical staff as appropriate to assist in the treatment of naval personnel.

At NPTU-Charleston, personnel are served by the onsite medical department and by the Naval Branch Medical Clinic on Joint Base Charleston.

ACCOUNTABILITY

Independent Overview and Investigation

Naval Reactors field offices conduct frequent inspections and audits of OSHOM programs to ascertain compliance with applicable requirements, to determine strengths and weaknesses, and to identify areas for improvement. These audits are complemented and augmented by periodic Environmental, Safety, and Health Inspections and annual program reviews conducted by Naval Reactors Headquarters personnel and representatives from other Naval Reactors field offices.

If significant safety or health events concerning civilian or Navy personnel at Program facilities occur, a formal independent Investigation Board is convened that includes senior personnel knowledgeable in the topical area and Naval Reactors field office or Headquarters personnel (references 7, 8, 19 and 20). The investigation typically involves extensive fact-finding, detailed review of processes and procedures, and a comprehensive evaluation of the event and its causes. The Investigation Board's conclusions are provided to the facility for review and development of corrective actions as required.

Internal Overview and Critical Self-Assessment

Safety and health professionals at each Program facility perform frequent and detailed inspections and surveillances to determine how well the facility's operating personnel are implementing OSHOM programs. In addition, each facility has an auditing organization which maintains and executes an independent OSH audit and surveillance program. The program concentrates on assessing work oversight and performance of work activities, effectiveness of training, and the results of safety process implementation. Furthermore, the Program facilities critically self-assess their own performance to identify areas for improvement.

The objective of critical self-assessment is for managers and leaders to develop and maintain a comprehensive day-to-day understanding of the problems faced by the organization, implement effective corrective actions, improve processes and prevent future problems. Effective self-assessment leads to a learning organization that demonstrates continuous improvement while efficiently producing quality results. At each facility, senior leadership has established the expectation and has developed the behaviors within all levels of management to routinely and critically assess performance within their cognizant area.

Critical self-assessment includes detailed reviews of functional areas where multiple organizations interact (e.g., electrical safety, elevated work) and is guided by a standardized process (reference 21). Based upon the scope and severity of the problems identified, causal analysis may be conducted by the cognizant managers and senior leadership to identify the underlying causes of potential systemic problems that may be affecting other facility operations. After the underlying causes are determined, short and long-term corrective actions are taken as necessary and the results of these actions are monitored to ensure the desired improvements are achieved.

MEASURES OF PERFORMANCE

Leading Indicator Metrics

Since 2007, the NR Program has used metrics from Program-defined Level 1 near-miss safety incidents that did not result in OSHA recordable injuries (reference 22) but had the potential to cause serious injury. Table 1 explains the primary types of Level 1 near-miss safety incidents that are used in the NR Program as leading indicator metrics. The final category, “Unsafe Behaviors or Conditions,” applies to similarly serious events that do not meet the criteria of the other categories (e.g., employee exposure to a hazardous chemical in excess of an established exposure limit). These near-miss metrics are used to proactively identify and evaluate events in order to prevent more serious accidents.

Category	NR Program Level 1 Safety Incident Criteria
<i>Electrical Shock</i>	An electrical shock during work that requires energized electrical work controls (i.e., greater than 50 volts) or caused by defective equipment.
<i>Energized Electrical Work Control Deficiencies</i>	Unauthorized entry into an energized electrical enclosure where the restricted approach boundary or arc flash boundary was crossed.
	Work performed on an energized electrical system/component without applying required energized electrical work hazard controls.
<i>Improper Hazardous Energy Control</i>	Unexpected hazardous energy is discovered after verification checks indicate the absence of hazardous energy and the hazardous energy places the worker at risk.
	Work performed on a system/equipment without the use of lockout/tagout (LOTO) when LOTO would be required to preclude exposure to hazardous energy.
	Removal of LOTO hazardous energy controls prior to restoring the affected system/equipment to a safe condition that exposes an employee to hazardous energy.
<i>Fall Protection and Elevated Work Problems</i>	Work performed without the use of an active means of fall protection when such protection is required and the fall hazard is not identified and mitigated by required technical direction.
	Work performed without the use of an active means of fall protection and the worker is exposed to an ejection hazard in an articulating or extensible boom aerial lift.
	Any fall from a height of greater than 6 feet above the next lower level.
	Work performed while using an improperly engineered or otherwise deficient Personal Fall Arrest, Restraint, Positioning, or Safety Net System that would not protect the worker as intended.
<i>Unsafe Behaviors or Conditions</i>	Any event, condition, or employee behavior that is determined to be of comparable severity to other safety incidents.

Table 1

The Level 1 safety incident criteria in table 1 are defined in the SRM (reference 9) and are consistently applied at each Program facility thereby allowing for a standardized measure of performance. Figure 1 provides an overview of the types and numbers of safety incidents experienced across the Program over the past 5 years. As a result of focused management attention, lessons learned from these events have resulted in improved work practices and jobsite conditions that have led to an improved safety posture and culture at each Program facility. Attention continues to focus on Program-defined Level 1 safety incidents and correcting less serious deficiencies before they result in more significant problems.

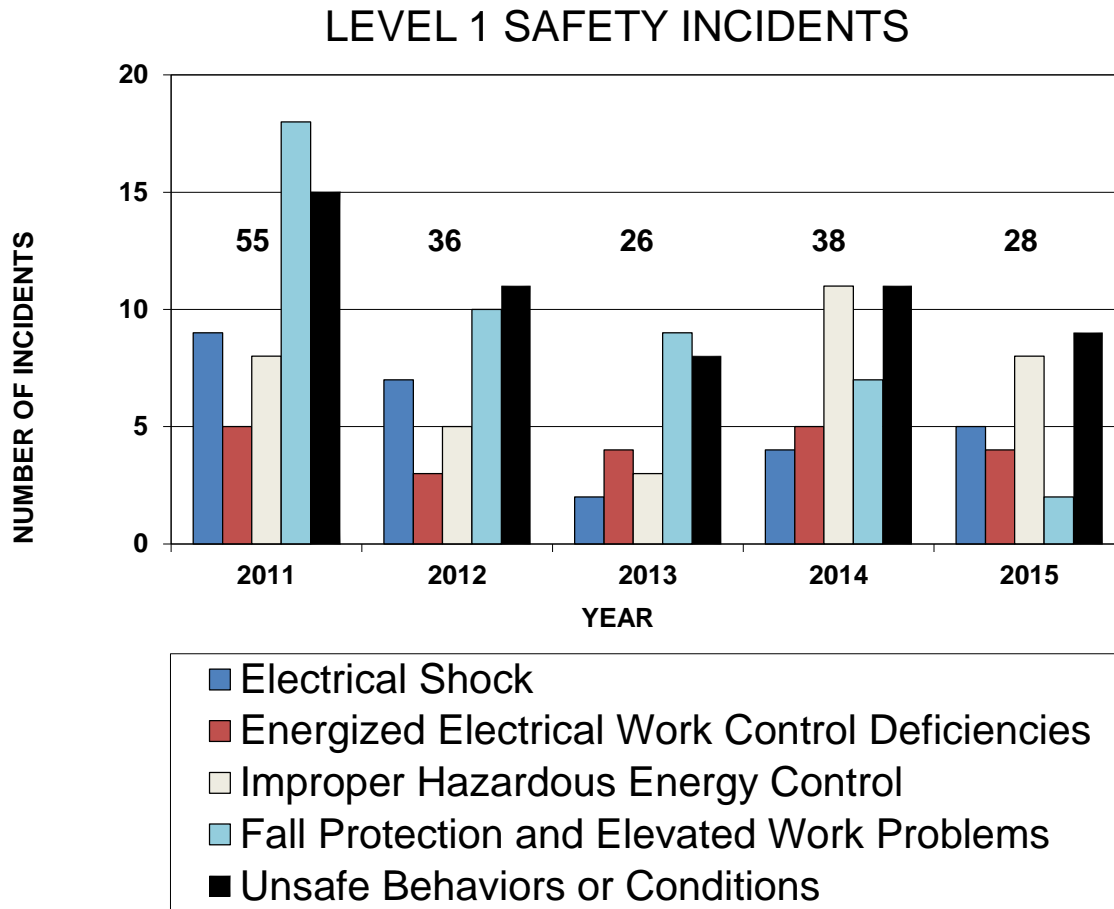


Figure 1

Program facilities also track numerous performance indicators to measure OSHOM program effectiveness. The indicators are consistent with those employed by general industry and the DOE using OSHA's occupational injury and illness reporting criteria (reference 22). The injury data provided for general industry were obtained from the Bureau of Labor Statistics (BLS) (reference 23). BLS data for 2015 are not currently available. The DOE data in figures 2 through 4 in this report are taken from injury and illness data as presented by the DOE (reference 24). These statistics provide a standard measure of the Program's trends relative to the DOE and general industry.

Fatalities

The Program has experienced no occupationally related fatalities at its DOE facilities or NPTU-Charleston since 1986. The Program has experienced three fatalities (all of which were subcontractor personnel) since the passage of the OSH Act in 1970. Two of the fatalities were due to falls; the third was an onsite suicide.

Recordable Injury and Illness Incidence Rate

OSHA recording criteria specify the recording of all cases involving work-related injuries or illnesses that need treatment beyond first aid. However, this data does not indicate the severity of an injury or illness; it only indicates that an injury or illness has occurred. For example, a cut requiring sutures, a broken arm, and a disabling back injury are not distinguishable in the reporting system; each of these injuries would be counted as one injury in the reported data. Rather, the severity of recordable injury or illness is indicated by restriction on the individual's work activity and/or days away from work.

Figure 2 shows the total recordable injury and illness incidence rates for the civilian work force in the Naval Reactors Program¹, DOE (reference 24), and general industry (BLS) (reference 23). The Program's recordable injury and illness rates have been an average of 37% lower than the comparable DOE rates and substantially lower than the BLS general industry rates over the past five years.

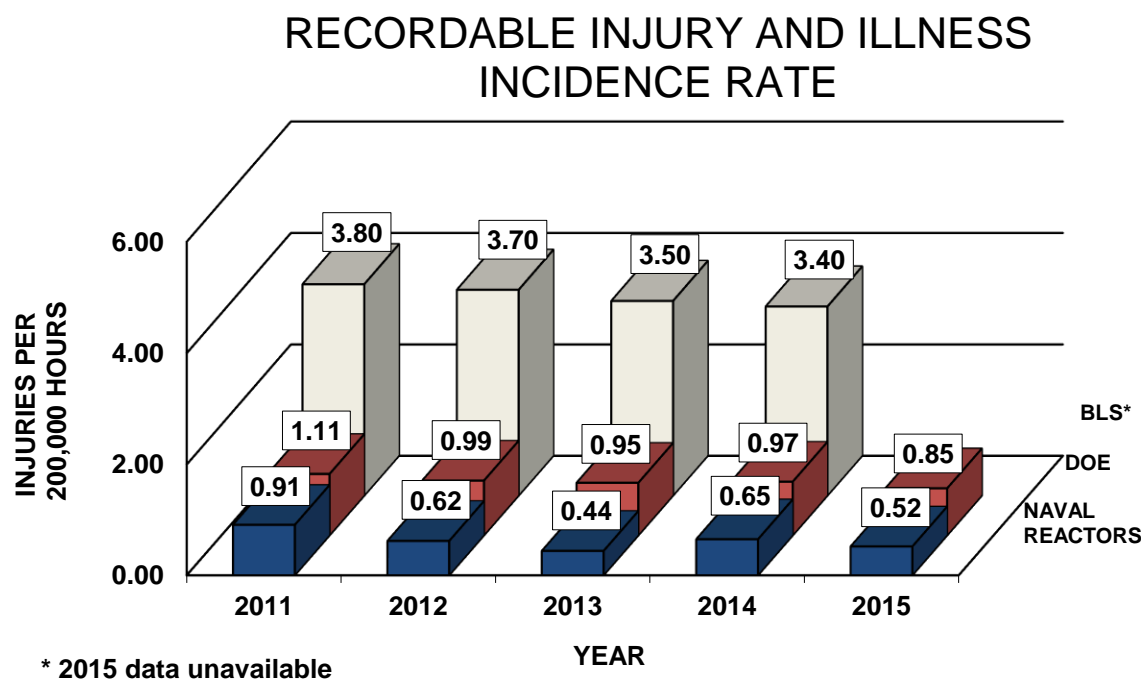


Figure 2

¹Naval Reactors Program civilian workforce data in figures 1 through 5 consist of data for civilian prime contractor and subcontractor personnel.

Restricted Workday Case Incidence Rate and Days Away From Work Case Incidence Rate

Injuries and illnesses reported in the Program are generally minor (e.g., cuts and abrasions) and require little or no time lost from work. Figure 3 shows the Program, DOE (reference 24), and general industry (BLS) rates (reference 23) of occupational injury or illness cases which resulted in the individual being able to remain at work but under restricted work activity.

Figure 3 shows that the Program's restricted workday case incidence rates have been an average of 18% lower than DOE rates and substantially lower than the BLS general industry rates over the past five years.

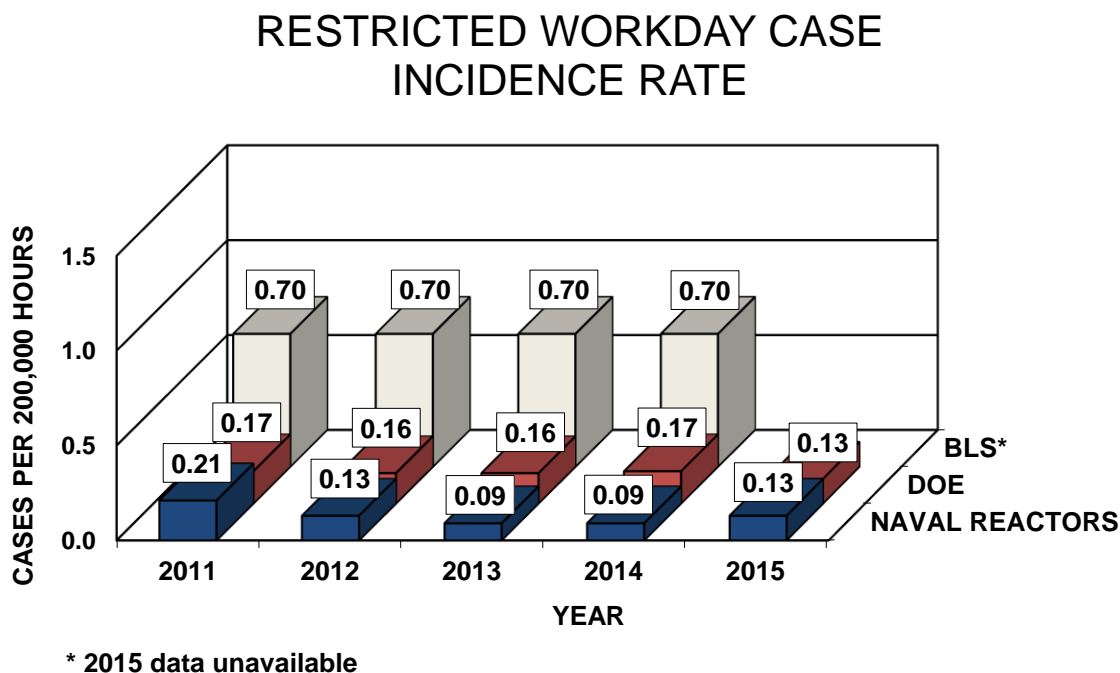


Figure 3

Figure 4 shows the Program, DOE (reference 24), and BLS rates (reference 23) of occupational injury or illness cases which resulted in the individual missing one or more days of work. The Program has maintained, on average, more than a 40% lower days away case rate in comparison to DOE over the past 5 years. The Program is also maintaining rates substantially lower than the days away rate of general industry.

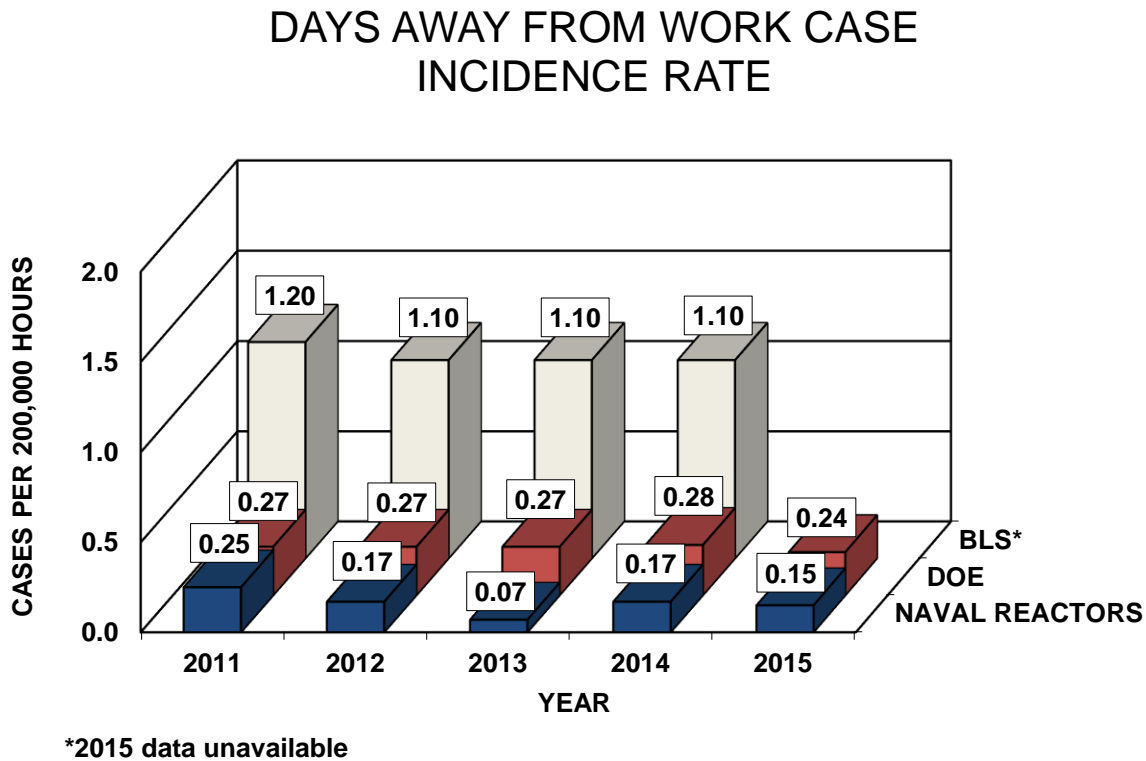


Figure 4

The Naval Reactors Program data in figures 2 through 4 represent the number of cases per 200,000 hours worked by civilian personnel, as determined by the OSHA injury and illness reporting criteria (reference 22). The Navy uses different occupational injury and illness reporting parameters (reference 25); therefore, direct comparison of reported incidence rates for civilian and Navy personnel is not meaningful. However, Naval Reactors reviews Navy personnel occupational injury and illness cases at Program facilities using the OSHA criteria for trending and tracking purposes only. In comparison with the civilian workforce data for 2015, the injury and illness recordable incidence rate for Navy personnel at Program facilities was 0.79 per 200,000 hours worked. The restricted workday case incidence rate was 0.15 cases requiring one or more restricted workdays per 200,000 hours worked. There were 13 cases in 2015 (0.13 cases per 200,000 hours worked) that required one or more days away from work. These incidence rates are similar to the Naval Reactors Program data in figures 2 through 4.

Cases Resulting in Work Limitations

Another view of Program occupational injury and illness severity is obtained by examining the man-years away or man-years restricted by a licensed health care professional. On average, more than 7759 man-years of effort are expended annually to accomplish the Program mission at the DOE sites and NPTU-Charleston. Figure 5 depicts the impact to the overall level of effort as a result of more serious occupational injuries experienced at the DOE sites. The trend shows that implementation of our safety principles and efforts to improve our safety culture have been substantially effective at reducing work limitations over the past 5 years.

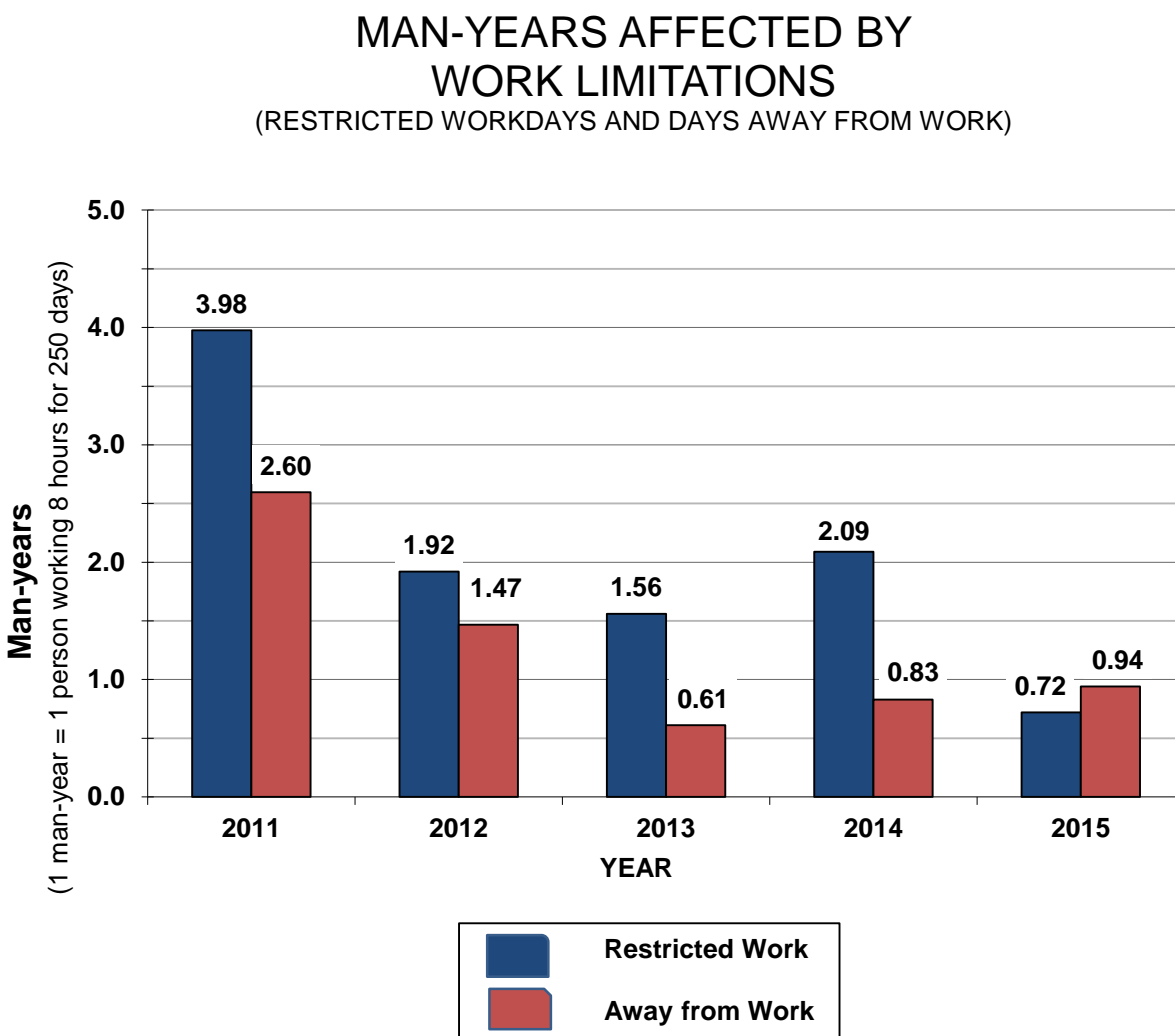


Figure 5

ABNORMAL OCCURRENCES

It is a fact of human nature that people make mistakes. The key to a good safety program is to find the mistakes while they are small and prevent the combinations of mistakes that lead to more serious consequences.

The Program participates in a DOE formal, structured process to evaluate serious accidents involving civilian or military personnel at Program DOE facilities. The DOE has established criteria to determine the reporting and investigation requirements for accidents, including fatalities, serious injuries, and significant damage to DOE property (references 19 and 26). The Navy also has established reporting and investigation requirements for accidents (references 7, 8, and 20).

The Program conducted a DOE accident investigation in response to the collapse of a partially-erected storage building at Naval Reactors Facility in June 2012. The collapse damaged an adjacent storage building and three pieces of subcontractor equipment. No personnel injuries resulted. The Program developed and implemented corrective actions based on this event. Prior to the collapse, the Program had not experienced an event warranting a DOE accident investigation since 2004.

In addition to using the DOE accident investigation process when required, the Program critiques significant events that caused or could have caused injury to personnel. Critiques are formal, detailed evaluations of an event conducted by qualified individuals at each facility, usually with Naval Reactors field office personnel in attendance. Pertinent facts are reviewed, underlying causes are established, and corrective actions are identified within the critique report. All corrective actions are tracked to closure to minimize the potential of more serious events with similar causes from occurring. Events that are critiqued include Program-defined Level 1 safety incidents and Level 2 safety events. Level 1 safety incident category descriptions and statistics used for trending purposes are provided in the previous section of this report in table 1 and figure 1, respectively. Level 2 safety events have the potential for less serious consequences than Level 1 safety incidents and may include such issues as safety-related work control errors, minor injuries, and near misses.

Incident reports receive further management review, including evaluation by senior personnel at Headquarters and review by the Director, Naval Reactors. The results of these reports and the lessons learned are shared between all Program facilities to ensure any necessary corrections are implemented to improve worker safety.

REFERENCES

- (1) Presidential Executive Order 12344, of February 1, 1982, is codified in part by United States Code, Title 50, Chapter 41, Subchapter I § 2406, "Deputy Administrator for Naval Reactors."
- (2) Presidential Executive Order 12344, of February 1, 1982, is codified in part by United States Code, Title 50, Chapter 42, Subchapter I § 2511, "Naval Nuclear Propulsion Program."
- (3) U.S. Navy Report, "Occupational Radiation Exposure from U.S. Naval Nuclear Plants and Their Support Facilities," T. J. Mueller, et al., NT-13-2, May 2013.
- (4) U.S. Department of Energy Report, "Occupational Radiation Exposure from Naval Reactors' Department of Energy Facilities," T. J. Mueller, et al., NT-13-3, May 2013.
- (5) Presidential Executive Order 12196, of February 26, 1980, appears at 45 FR 12769, 3 CFR, 1980 Comp., page 145, "Occupational Safety and Health Programs for Federal Employees."
- (6) Code of Federal Regulations Title 29 (Labor) CFR 1960, "Basic Program Elements for Federal Employees OSHA."
- (7) OPNAV Instruction 5100.23, "Navy Safety and Occupational Health (SOH) Program Manual."
- (8) OPNAV Instruction 5100.19, "Navy Safety and Occupational Health (SOH) Program Manual for Forces Afloat."
- (9) NAVSEA S9213-55-MAN-000/(U), "Naval Reactors Program Safety Requirements Manual."
- (10) Naval Reactors Program, "Health and Safety Standards Reference Document."
- (11) U.S. Department of Energy Order 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees."
- (12) NAVMED P-5010, "Manual of Naval Preventive Medicine."
- (13) United States Office of Personnel Management, "Standards for Safety and Occupational Health Management" and "Industrial Hygiene Series."
- (14) National Archives & Records Administration, Office of the Federal Register, "Federal Register."
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- (16) Code of Federal Regulations Title 29 (Labor) Part 1926, "Safety and Health Regulations for Construction."

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- (21) PC-SA-1, "Self-Assessment and Continuous Improvement Guidelines for NR Prime Contractors."
- (22) Code of Federal Regulations Title 29 (Labor) Part 1904, "Recording and Reporting Occupational Injuries and Illnesses."
- (23) U.S. Department of Labor, Bureau of Labor and Statistics, "Industry Injury and Illness Data," <http://www.bls.gov/iif/oshsum.htm> (as of 14 March 2016).
- (24) U.S. Department of Energy, "Computerized Accident/Incident Reporting System (CAIRS) – Injury and Illness Dashboard" <http://energy.gov/hss/services/reporting/analytical-dashboards> (as of 14 March 2016).
- (25) Department of Navy, Assistant Secretary of the Navy, Special Assistant for Safety, "The Department of the Navy, FY 2013 Annual Occupational Safety and Health Report to the Secretary of Labor," http://www.public.navy.mil/comnavsafecen/Pages/osh/SOH_Metrics/SOH_Metrics.aspx (as of 14 March 2016).
- (26) U.S. Department of Energy Order 231.1B, "Environment, Safety, and Health Reporting."